

REMARKS

The specification and claims have been carefully reviewed in light of the second Office Action (non-final) of December 18, 2009.

Claim 1 has been amended to incorporate the subject matter of claims 7 and 11, which have been canceled, without prejudice. Claim 8 has been amended to depend on claim 1.

Care has been taken not to introduce any new matter.

The Present Invention

The present invention relates to a method for producing a water soluble porous polymeric material comprising the steps of; (a) providing a C/W emulsion comprising an aqueous phase, a water soluble polymeric matrix building material, a surfactant and liquid CO₂ phase; (b) at least partially freezing the aqueous phase; (c) gasifying CO₂ from the liquid CO₂ phase to form an intermediate porous material; (d) venting the gasified CO₂ from the intermediate porous material; and (e) freeze drying the intermediate porous material at least substantially to remove the aqueous phase and form the porous material.

The present invention also relates to a water soluble porous material obtainable by the method.

Obviousness – 35 USC § 103

The Examiner has rejected claims 1-21 and 23-30 as being obvious over the combination of Ko *et al.* (US2003/0134918) and the paper published by Butler *et al.* (Adv. Mater. 2001, **13**, No. 19, 1459-1463).

The crux of the Examiner's argument seems to rest on his assertion that addition of a cross-linking agent to the emulsion in Ko *et al.* is an **optional** step, and therefore because water-soluble polymers are "dispersed in the aqueous phase of the emulsion...the compositions of Ko *et al.* may be water-soluble porous materials" – see especially paragraph 10 of the Action, but also paragraphs 17 and 26.

Ko et al.

Ko *et al.* is directed to a method of making absorbent composites having enhanced intake rates and retention properties using super critical fluid technology, and to such composites themselves (see paragraphs [0001] and [0006]).

Paragraph [0007] describes how in a traditional high internal phase emulsion (HIPE) foam, the monomer and cross-linking agents are present in the oil phase of a water-in-oil (W/O) emulsion system, and the steps required to remove the aqueous liquid remaining in the resultant cross-linked polymerised foam. In an inverse HIPE (I-HIPE) foam, such as is produced from an oil-in-water (O/W) emulsion system, there can be difficulties in extracting the oil phase from the cross-linked polymer matrix after polymerisation.

The essence of the teaching in Ko *et al.* is to substitute a supercritical fluid, such as CO₂, either partially or completely for the oil in both a W/O and an O/W emulsion system – see paragraphs [0007] and [0008].

Paragraph [0008] states that “after polymerisation [i.e. to form a cross-linked polymer] in the water phase occurs, the CO₂ is easily extracted from the polymer as a gas”.

The compositions in Ko *et al* further comprise superabsorbent polymeric foam produced by both HIPE and I-HIPE polymerisation of in-situ redox monomers for use in personal care articles such as diapers, feminine hygiene products, disposable training pants, incontinence devices, medical sponges, etc, etc, which fits with the stated aim of subject of the disclosure therein as being to “absorbent articles”. It would be difficult to imagine any of these products if they did not include an absorbent functional layer, made from a composition as described, and instead had a dissolving functional layer.

Paragraphs [0036] to [0038] are directed to HIPE foams, which as stated above utilise a W/O emulsion system. As such, these embodiments are not relevant to the present invention which relates to a C/W (CO₂-in-water) emulsion system.

However, the Examiner has drawn our attention to paragraph [0038] as teaching that a cross-linking agent is only an **optional** ingredient in forming a HIPE foam. Unfortunately, this interpretation of this paragraph “cherry picks” parts of this text, instead of viewing the reference and the invention as a whole. Paragraph [0038] builds on the teaching of paragraph [0037], which incorporates by reference the teachings of US5652194, US5260345, US5817704 and US5268224. In **each** of these references, the oil phase of a W/O emulsion system comprises:

- (a) a water-insoluble, monofunctional glassy monomer;
 - (b) a water-insoluble, monofunctional rubbery co-monomer; **and**
 - (c) a water-insoluble polyfunctional crosslinking agent
- to achieve a crosslinked, polymerised foam product.

Ko *et al.* clearly embrace these teachings and modify them as stated at the end of paragraph [0037]: “in the present invention, the oil phase may comprise a

supercritical fluid or a blend of a supercritical fluid and other fluids such as liquid oils”.

The text in paragraph [0038] which the Examiner has relied on is merely an (almost) word-for-word repetition of the disclosure in US5652194, for which see column 4, lines 18-58. Thus the Examiner’s assertion that the crosslinking agent is merely an **optional** ingredient based on this portion of Ko *et al* is incorrect.

Furthermore, the Examiner has referred to paragraph [0022] in relation to the crosslinking agent being optional. Paragraph [0022] refers to cross-linking **monomers**, and not to crosslinking agent. As defined therein, a cross-linking monomer is a moiety having at least two polymerisable, unsaturated groups in its molecular unit. Such cross-linking monomers will **self-crosslink**. Paragraph [0022] merely states that an **additional** crosslinking agent may be added to the cross-linked monomers. If the crosslinking agent is omitted in this circumstance (which it may be), crosslinking of the monomers in the polymer will still occur.

Turning now to paragraphs [0039] to [0045] which are directed to I-HIPE foams utilising an O/W emulsion system, US provisional application no 10/289,234 also to Ko *et al*. is incorporated by reference.

Paragraph [0040] of Ko *et al*. states that “the chemical nature....of the polymer material which forms the inverse HIPE foam structures....is determined by the types and quantity of the monomers, co-monomers and crosslinkers utilised in the emulsion” – note that these are the same **essential** ingredients as for the HIPE foam above.

From paragraph [0044] it is clear that once a crosslinked, polymeric I-HIPE foam has been formed, any unpolymerised material is removed. “Water-soluble materials or unbound solids particles or loose [sic] fibres can be removed by any combination of washing with water, steam stripping, impinging with air jets, mechanical vibration, vacuum treatment and the like.” Thus there will be no free monomer, or any other water-soluble component, in the final absorbent foam material.

Butler et al.

Turning now to the teaching of Butler *et al.*, in paragraph 19 of the Office Action, the Examiner states that this reference teaches use of crosslinked acrylamide-based polymers to produce the porous material therein, but that the teaching can also be applied to a **wider** range of materials, e.g. in one example the crosslinked acrylamide is substituted with 2-hydroxyethyl acrylate – see the bottom of the left-column on page 1461 – which the Examiner states is a water soluble matrix.

However, it appears from the notes underneath the table on page 1461 that for Sample 4 (having note [c]), although 2-hydroxyethyl acrylate is used in place of crosslinked acrylamide (AM), the AM had been present in an 8:2 ratio with N,N-methylene bisacrylamide (MBAM). The combination of the 2-hydroxyethyl acrylate with MBAM still leads to a crosslinked, polymeric foam, regardless of the fact that one of the monomers (2-hydroxyethyl acrylate) is water soluble prior to its polymerization.

Therefore there is no teaching in Butler *et al.* which could be used to modify the teaching in Ko *et al.* to arrive at the present invention as claimed in the amended claims. We thus conclude that the current amended claims are inventive and non-obvious over the said combination of documents.

CONCLUSION

In light of the above remarks, applicants submit that the claims pending in the present application are in condition for allowance. Reconsideration and allowance of the application is respectfully requested. The examiner is invited to contact the undersigned if there are any questions concerning the case.

Respectfully submitted,

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